

SINGAPORE

Ready for an active role in the global energy revolution

Whilst a small island nation with a population of only around six million people, Singapore lies at the heart of the culturally diverse South-East Asian region whose primary economic objective is to maintain robust and sustainable growth throughout its rapidly developing but diverse economies.

Given its size and lack of energy resources, Singapore's economy has historically been largely developed on the back of its ability to act as a trading hub, utilising the significant domestic resources of its neighbours. Within the energy sector, Singapore has developed itself as a significant energy trader and a centre of energy finance, allowing it not only to secure its own energy supplies but to create a large-scale trading hub both for crude and refined hydrocarbon products.

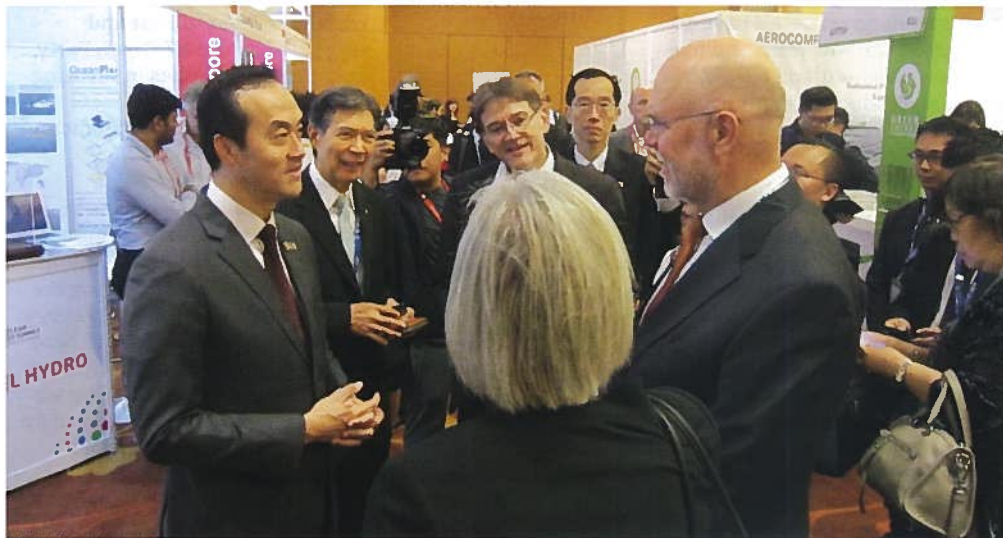
Singapore has invested heavily in building oil refining and petrochemical production facilities and has created the region's largest and most complex processing and refining complex on Jurong Island. Whilst power was predominantly generated from oil during its early development, Singapore has since 2000 rapidly transitioned towards the use of natural gas (now representing over 95% of the total power mix) initially piped from Indonesia and Malaysia.

The nation is now committed to developing itself as a hub for LNG. In 2013, Singapore's \$1bn LNG terminal began operation with a current capacity of 6mn t/y and significant expansion is already underway.

Singapore has now also started to embark on a massive programme aimed at creating a cleaner and more efficient energy future: including the use of renewables.

Rethink energy, navigate change

This year's Singapore International Energy Week (SIEW) concentrated firmly on how Singapore and the South-East Asian region as a whole should start mapping out its development plans.



In this, the last of our series of articles from international branches of the Energy Institute, we visit Singapore, from where Peter Godfrey, Managing Director Asia-Pacific for the EI, writes.

'These strategies will point the direction for long-term infrastructure planning and guide stakeholders and companies so that they can make informed decisions to maximise deployment of clean energy and energy efficient solutions,' said Deputy Prime Minister (DPM) Teo Chee Hean during his Singapore Energy Lecture that opened the event.

In addition to announcing the setting up of a National Energy Transformation Office to be housed within the Energy Market Authority, he cited three key thrusts of this effort: improving energy efficiency, harnessing renewable energy in more innovative and efficient ways, and continuing to aggressively invest in energy research and development (R&D) where appropriate. He also reiterated the need for Singapore to closely collaborate and cooperate with both its regional neighbours and valued international partners in this process.

Current EI President Malcolm Brinded (right) and Louise Kingham (EI CEO) meeting Dr Koh Poh Koon, Senior Minister of State, Ministry of Trade & Industry, Singapore at the Asia Clean Energy Summit, part of Singapore International Energy Week, in October 2017.

Singapore's five stated strategic objectives within the energy sector may be summarised as:

- diversification of energy sources aimed at ensuring sustainable energy security;
- enhancing energy infrastructure and systems to remain at the forefront of technological development;
- continuous improvement in energy utilisation and efficiency;
- strengthening the 'green economy'; and
- ensuring that the cost/price of energy is positioned to maximise economic growth potential.

Focus on energy efficiency

DPM Teo explained that ramping-up efforts to improve energy efficiency would reduce operating costs for companies and help manage the country's overall energy demand growth.

In 2015, Singapore companies achieved an industrial energy efficiency improvement of 0.6%, a figure that he noted was 'not good enough'. The goal is to at least double this to the 1%–2% improvement achieved by countries such as Belgium and The Netherlands.

Singapore will also be introducing a carbon tax in 2019 to send a signal to companies on the value placed on greenhouse gases. Revenue from the tax will be used to fund measures that help companies reduce their emissions.

'This will ensure that those who emit the most greenhouse gases will fairly bear the costs to our environment, and further encourages all sectors to reduce their emissions and improve energy efficiency,' said DPM Teo.

Further use of renewables

Singapore is also looking to increase the use of renewable energy, in particular solar photovoltaic (PV), to replace fossil fuels in the country's energy mix. Natural gas accounts for about 95% of the nation's electricity generation today. However, solar energy, without subsidies, could potentially contribute 2 GW by 2025, or about one quarter of Singapore's projected peak electricity demand, according to a study by the Sustainable Energy Association of Singapore (SEAS).

To develop the use of this renewable energy, the government is test-bedding floating solar panels on reservoirs, and also exploring the possibility of deploying solar panels on vertical building surfaces, revealed DPM Teo.

Despite its own lack of ability to deploy alternative energy resources due to limited land area, Singapore has embarked upon an ambitious 'Smart Nation' programme aimed at spearheading the country towards maximum self-sustainability. It is also establishing itself as a centre of excellence for the regional development and deployment of low carbon energy systems and skills in three main areas: energy efficiency, transport and smart grid technologies.

The development of innovative

technologies will remain key to promoting energy efficient and clean energy solutions in Singapore, DPM Teo noted.

'To that end, the government has set aside some \$660mn for R&D in the areas of urban and sustainability solutions, of which energy is a key focus. These funds are being used to support the piloting and test-bedding of new technologies in areas such as power systems, smart grids, energy storage, green buildings and green data centres to accelerate their commercialisation,' said DPM Teo.

An active pan-regional and global role

Beyond tackling its own energy challenges, Singapore is keen to continue to play an active role in the development of both the regional and global energy architecture. Singapore actively participates in international forums and has joined the International Energy Agency (IEA) as an associate member.

Singapore will assume the chairmanship of ASEAN (Association of Southeast Asian Nations) in 2018 and plans to tap into global mega-trends such as energy transformation and e-commerce.

A recent OECD report stated that real GDP growth in Emerging Asia (the 10 ASEAN member countries – Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam – plus China and India) is expected to remain robust at an average of 6.2% over 2017–2021 compared with 6.5% in 2016. China's growth is expected to moderate to an annual average of 6% over the medium term. Growth in India will remain high, at 7.3% over the medium term, similar to the around 7.0% expected in 2017.

To fuel this growth, long-term projections by the IEA show an over 50% increase in regional energy consumption to be due to socio-economic factors including increasing population, sustained economic growth and increasing access to electricity.

Increasing regional cooperation and integration will lie at the heart of the region's success in sustaining sustainable economic growth. This is especially true in the current context of slower global economic growth and the implementation of more inward-looking policies in some parts of the world.

Within the context of energy, the ASEAN region remains highly diverse in terms of resource availability. Underpinning the development of policies aimed at securing sustainable and affordable energy security, whilst at the same time ensuring that environmental and social implications are fully taken into account, remains paramount.

Setting the right conditions for the development of renewable energy in Emerging Asia will require solutions to challenges in grid access, administrative barriers and energy pricing mechanisms. Much of the region has adopted specific targets for the implementation of renewable energy capacities, as well as policy mechanisms to foster the development of renewables that are not yet competitive with conventional energy sources.

Among these, feed-in tariffs (FiTs) and a price-driven policy mechanism that offers long-term purchase agreements to power producers for given renewable energy technologies, are commonly used. While FiTs can be effective, setting appropriate tariffs levels can be challenging. Singapore has recently introduced a carbon tax.

Due to their size, China and India are making very large contributions to global investment in renewable energy. Vietnam, Thailand, Malaysia and Lao PDR are leading investment among ASEAN countries, with particularly large investments in hydropower.

Foreign direct investment (FDI) will be an important channel for investment in renewables that also enables the transfer of capital, technology and expertise. India, China and Indonesia have received the largest inflows in the region, accounting for more than 60% of the total. FDI is also helping to support the expansion of green jobs. ●

The Energy Institute in Singapore

The EI is in the process of developing a strong collaborative network in Singapore with the aim of both expanding its membership base as well as developing collaborative relationships with the aim of sharing best practice between the UK and the Asian region spanning the whole energy sector.

During SIEW, the EI signed MoUs with two Singaporean trade organisations: the Sustainable Energy Association Singapore (SEAS) and the Singapore Chemical Industries Council (SCIC).

Both MoUs are primarily focused on the work that the EI does in energy management. The EI and the SEAS will work together with a view to developing greater capacity to support Singapore and the South-East Asian region's

ability to transition towards lower carbon energy systems through the organisation of mutual events, supporting networks of professionals and developing skills through training.

The SCIC MoU is focused around working with Singapore's petrochemicals industry to find ways and means to significantly lower its carbon footprint. The EI and SCIC plan to work to deliver energy management training, knowledge and certification to the chemical industry in Singapore. A large amount of SCIC's output also relates to process safety, another area of mutual interest.

For information about the EI's activities in Singapore and across the Asia-Pacific region, contact Peter Godfrey, Managing Director EI – Asia-Pacific: pgodfrey@energyinst.org